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10/720,058	11/25/2003	Yean-Kuen Fang	87391.0600	4199

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BAKER & HOSTETLER LLP
WASHINGTON SQUARE, SUITE 1100
1050 CONNECTICUT AVE. N.W.
WASHINGTON, DC 20036-5304

EXAMINER	
RAABE, CHRISTOPHER M	
ART UNIT	**PAPER NUMBER**
2879	

DATE MAILED: 07/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/720,058	FANG ET AL.	
	Examiner	Art Unit	
	Christopher M. Raabe	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely..
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4,7-11,13,14,16,18,20,22-24,26-32,34,36,38 rejected under 35 U.S.C. 102(b) as being anticipated by Forrest et al. (US Pre-grant Publication 2001/0002279).

With regard to claim 1,

Forrest et al. disclose a method for manufacturing an organic light-emitting diode, comprising: providing a substrate into a chamber (paragraphs 18,19); forming an anode on the substrate (paragraph 42); forming a hole transport layer on the anode (paragraph 43), wherein the step of forming the hole transport layer comprises adding a reaction gas, and the reaction gas forms a plurality of impurities to trap holes (paragraph 43); forming an electron transport layer on the hole transport layer (paragraph 44); and forming a cathode on the electron transport layer (paragraph 45).

With regard to claim 2,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the substrate is a transparent substrate (paragraph 25).

With regard to claim 3,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the material of the substrate is selected from the group consisting of glass, silicon and plastics (paragraph 25).

With regard to claim 4,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the anode is an indium tin oxide (ITO) transparent electrode (paragraph 42).

With regard to claim 7,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the material of the hole transport layer is an organic material having a hole transport function (paragraph 43).

With regard to claim 8,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the material of the hole transport layer comprises N,N'-diphenyl-N,N'-bis(3-methyl-phenyl)-1,1'biphenyl-4,4'diamine (TPD) (paragraph 43).

With regard to claim 9,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the material of the electron transport layer is an organic material having an electron transport function (paragraph 44).

With regard to claim 10,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the material of the electron transport layer comprises aluminum tris-(8-hydroxyquinoline) [Alq_3] (paragraph 44).

With regard to claim 11,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the material of the cathode is selected from the group consisting of metal and compound metal (paragraph 45).

With regard to claim 13,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the step of forming the hole transport layer further comprises controlling an initial growth pressure of the hole transport layer between $1x10^{-8}$ torr and $1x10^{3}$ torr (paragraph 24).

With regard to claim 14,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein in the step of forming the hole transport layer, further comprises controlling a pressure of the chamber between $1x10^{-7}$ torr and $1x10^{-2}$ torr when adding the reaction gas (paragraph 24).

With regard to claim 16,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the reaction gas is selected from the group consisting of N_2, NH_3, N_2O, NO and NO_2 (paragraph 43).

With regard to claim 18,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the step of forming the electron transport layer further comprises controlling a growth pressure of the electron transport layer between $1x10^{-8}$ torr and $1x10^{-3}$ torr (claim 12).

With regard to claim 20,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the step of forming the cathode further comprises controlling a pressure of the chamber between $1x10^{-8}$ torr and $1x10^{-2}$ (claim 12)

With regard to claim 22,

Forrest et al. disclose a method for manufacturing an organic light-emitting diode, comprising: providing a substrate into a chamber (paragraphs 18,19), wherein an anode is formed on the substrate (paragraph 42); performing an evaporation step to form a hole transport layer on the anode (paragraphs 3,42), wherein the evaporation step comprises evaporating the material of the hole transport layer and a reaction gas to make the reaction gas form a plurality of impurities in the hole transport layer to confine holes (paragraph 43); forming an electron transport layer on the hole transport layer (paragraph 44); and forming a cathode on the electron transport layer (paragraph 45).

With regard to claim 23,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the substrate is a transparent substrate, and the material of the substrate is selected from the group consisting of glass, silicon and plastics (paragraph 25).

With regard to claim 24,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the anode is selected from the group consisting of an indium tin oxide transparent electrode and an indium zinc oxide transparent electrode (paragraph 42).

With regard to claim 26,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein between the step of providing the substrate and the evaporation step, the method for manufacturing an organic light-emitting diode further comprises performing a pump step to make the chamber have an initial growth pressure of the hole transport layer (claim 12).

With regard to claim 27,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the initial growth pressure is between $1x10^{-8}$ torr and $1x10^{-3}$ torr (claim 12).

With regard to claim 28,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the material of the hole transport layer is an organic material having a hole transport function (paragraph 43).

With regard to claim 29,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the material of the hole transport layer comprises N,N'-diphenyl-N,N'-bis(3-methyl-phenyl)-1,1'biphenyl-4,4'diamine (paragraph 43).

With regard to claim 30,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the material of the electron transport layer is an organic material having an electron transport function (paragraph 44).

With regard to claim 31,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the material of the electron transport layer comprises aluminum tris-(8-hydroxyquinoline) (paragraph 44).

With regard to claim 32,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein in the evaporation step, further comprises controlling a pressure of the chamber between 1.times.10^{-7} torr and 1x10^{-2} torr (claim 12).

With regard to claim 34,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the reaction gas is selected from the group consisting of N_2, NH_3, N_2O, NO and NO_2 (paragraph 43).

With regard to claim 36,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the step of forming the electron transport layer further comprises controlling a growth pressure of the electron transport layer between $1x10^{-8}$ torr and $1x10^{-3}$ torr (claim 12).

With regard to claim 38,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode, wherein the material of the cathode is selected from the group consisting of metal and compound metal (paragraph 45).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 5,6,12,17,25,35,39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forrest et al. as applied to claims 1,22 above, and further in view of Yamanaka et al. (US Pre-grant Publication 2002/0160553).

With regard to claim 5,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose the anode being an indium zinc oxide (IZO) transparent electrode.

Yamanaka et al. do disclose an anode being an indium zinc oxide transparent electrode (paragraph 475).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the anode material disclosed by Yamanaka et al. into the method of manufacturing of Forrest et al. in order to provide a material with good hole donating characteristics.

With regard to claim 6,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose the step of forming the anode being performed by using a method selected from the group consisting of a sputtering method, an evaporation method, an e-gun evaporation method, a spin-coating method and a chemical vapor deposition method.

Yamanaka et al. do disclose a step of forming an anode being per performed by using a method selected from the group consisting of a sputtering method, an evaporation method, an e-gun evaporation method, a spin-coating method and a chemical vapor deposition method (paragraph 328).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the step disclosed by Yamanaka et al. into the method of manufacturing of Forrest et al. in order to efficiently provide an anode material on a substrate.

With regard to claim 12,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose the material of the cathode being aluminum.

Yamanaka et al. disclose the material of the cathode being aluminum (paragraph 234).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the cathode material disclosed by Yamanaka et al. into the method for manufacturing of Forrest et al. in order to provide a cathode with good electron donation characteristics.

With regard to claim 17,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose a flow rate of the reaction gas being between 1 sccm and 20 sccm.

Yamanaka et al. do not disclose a flow rate of a reaction gas being between 1 sccm and 20 sccm (paragraph 123).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the flow rate disclosed by Yamanaka et al. into the method of manufacturing of Forrest et al. in order to provide good reaction conditions.

With regard to claim 25,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose the step of forming the anode being performed by using a method selected from the group consisting of a sputtering method, an evaporation method, an e-gun evaporation method, a spin-coating method and a chemical vapor deposition method.

Yamanaka et al. do disclose a step of forming an anode being per performed by using a method selected from the group consisting of a sputtering method, an evaporation method, an e-gun evaporation method, a spin-coating method and a chemical vapor deposition method (paragraph 328).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the step disclosed by Yamanaka et al. into the method of manufacturing of Forrest et al. in order to efficiently provide an anode material on a substrate.

With regard to claim 35,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose a flow rate of the reaction gas being between 1 sccm and 20 sccm.

Yamanaka et al. do not disclose a flow rate of a reaction gas being between 1 sccm and 20 sccm (paragraph 123).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the flow rate disclosed by Yamanaka et al. into the method of manufacturing of Forrest et al. in order to provide good reaction conditions.

With regard to claim 39,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose the material of the cathode being aluminum.

Yamanaka et al. disclose the material of the cathode being aluminum (paragraph 234).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the cathode material disclosed by Yamanaka et al. into the method for manufacturing of Forrest et al. in order to provide a cathode with good electron donation characteristics.

5. Claims 15,19,33,37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forrest et al. as applied to claims 1,22 above, and further in view of Kim et al. (US Pre-grant Publication 2002/0098378).

With regard to claim 15,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose the step of forming the hole transport layer being performed for 100 seconds to 5 minutes.

Kim et al. do disclose a step of forming a hole transport layer being performed for 100 seconds to 5 minutes (paragraph 37).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the duration disclosed by Kim et al. into the method for manufacturing of Forrest et al. in order to form a hole transport layer of optimal thickness.

With regard to claim 19,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose the step of forming the electron transport layer being performed for 100 seconds to 6 minutes.

Kim et al. do disclose a step of forming an electron transport layer being performed for 100 seconds to 6 minutes (paragraph 78).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the duration disclosed by Kim et al. into the method for manufacturing of Forrest et al. in order to form an electron transport layer of optimal thickness.

With regard to claim 33,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose the step of forming the hole transport layer being performed for 100 seconds to 5 minutes.

Kim et al. do disclose a step of forming a hole transport layer being performed for 100 seconds to 5 minutes (paragraph 37).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the duration disclosed by Kim et al. into the method for manufacturing of Forrest et al. in order to form a hole transport layer of optimal thickness.

With regard to claim 37,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose the step of forming the electron transport layer being performed for 100 seconds to 6 minutes.

Kim et al. do disclose a step of forming an electron transport layer being performed for 100 seconds to 6 minutes (paragraph 78).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the duration disclosed by Kim et al. into the method for manufacturing of Forrest et al. in order to form an electron transport layer of optimal thickness.

6. Claims 21,40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forrest et al. as applied to claims 1,22 above, and further in view of Pichler et al. (US Patent 6402579).

With regard to claim 21,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose the step of forming the cathode being performed for 1 second to 1 minute.

Pichler et al. do disclose a step of forming a cathode being for 1 second to 1 minute (column 5, line 62 – column 6, line 15).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the duration disclosed by Pichler et al. into the method for manufacturing of Forrest et al. in order to form a cathode of optimal thickness.

With regard to claim 40,

Forrest et al. disclose the method for manufacturing an organic light-emitting diode.

Forrest et al. do not disclose the step of forming the cathode being performed for 1 second to 1 minute.

Pichler et al. do disclose a step of forming a cathode being for 1 second to 1 minute (column 5, line 62 – column 6, line 15).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the duration disclosed by Pichler et al. into the method for manufacturing of Forrest et al. in order to form a cathode of optimal thickness.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent 5874803, 5998803, US Pre-grant Publications 2002/0157596, 2003/0030059,2003/0018097, 2002/0070385.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher M. Raabe whose telephone number is 571-272-8434. The examiner can normally be reached on m-f 7am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CR

ASHOK PATEL
PRIMARY EXAMINER